V-SHAPED DISPOSITION EFFECT AND ASSET PRICING IMPLICATIONS: EVIDENCE FROM THAILAND'S STOCK MARKET

BY

MR. KUNTHORN WAIYASARA

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE PROGRAM IN FINANCE (INTERNATIONAL PROGRAM) FACULTY OF COMMERCE AND ACCOUNTANCY THAMMASAT UNIVERSITY ACADEMIC YEAR 2016

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ABSTRACT

Using stock level data, I document that return patterns in relation to proxies of investors' aggregate unrealized gains and losses are consistent with V-shaped selling schedule that is investors' selling propensity increases as the magnitude of unrealized gains and losses increases. The effect of unrealized gains is stronger than that of unrealized losses and this asymmetry underlies the traditional disposition effect hence it is called V-shaped disposition effect. I find that stocks for which investors have large unrealized gains and losses outperform in the following month and a trading strategy based on this effect can generate 1.7% monthly alpha.

Keywords: Disposition effect, Behavioral finance, Asset pricings, Thailand's stock market

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CHAPTER 1
INTRODUCTION

1.1. Introduction

Many empirical studies[1] confirm the existence of the disposition effect, one of the most notable works in behavioral finance, which describes irrational behavior of a certain group of investors who tend to sell securities that have appreciated in price rather than those securities whose prices have decreased since purchase. The Prospect theory, proposed by Kahneman and Tversky (1979), has been widely used to explain this phenomenon. According to the Prospect theory, investors value gains and losses differently. They tend to be risk-averse when they are exposed to gains but comparatively tend to be risk-seeking when they face losses. The empirical studies[2] on the disposition effect typically assume the selling propensity of investors is monotonically increasing function in response to profits. The interpretation of this assumption is that investors would have more tendency to hold on to losing securities as magnitude of losses increases. This is resulting from, based on the Prospect theory's explanation, the willingness to take more risk because of risk-seeking behavior to avoid a sure loss from the selling decisions.

In contrast to these studies, Ben-David and Hirshleifer (2012) and An (2016) suggest that investors do not really hold on to losing securities as their losses becomes larger in magnitude. In fact, their willingness to sell losing securities increases with an increase in magnitude of losses. Moreover, Ben-David and Hirshleifer (2012) and An (2016) observe that invertors' propensity to sell securities in response to profits is actually a V-shaped function with a kink around the zero profit. They also observe that the alphabet V is not symmetrical due to a steeper slope on the domain of loss compared to that on the domain of gain. They suggest that this asymmetry of V-shaped selling schedule underlies the disposition effect because the average selling propensity on the gain side is higher implying that investor tend to sell winners than losers.

[1] See Chapter 2 – Review of Literature
[2] See Odean (1998), Grinblatt and Han (2005), Frazzini (2006), and Goetzmann and Massa (2008)

The motivation for this study comes from an interest in how investors in Thailand's stock market practically trade in response to magnitude of profits. In the faith of traditional finance theory, investors are assumed to always be rational when making decisions; however, a growing literature in behavioral finance indicates the opposite and one among others is the disposition effect where investors tend to sell their winners too early but hold onto their losers too long. As is the case with the U.S. and other countries, numbers of studies also provide empirical evidence confirming the existence of the disposition effect in this stock market, but these studies focus on a difference in selling probability conditioned on the sign of profit (gain or loss) rather than its magnitude. This study is therefore the first study that provides a functional form of how investors in Thailand's stock market trade in the light of unrealized profits.

This study offers two sets of findings. First, it provides an empirical evidence of the existence of V-shaped disposition effect in Thailand's stock market. By adopting An (2016) methodology created to investigate the effect against the U.S stock data, I document the return patterns in relation to unrealized gains and losses of investors are consistent with the V-shaped selling schedule.

Second, this study demonstrates that a portfolio of stocks with large magnitude of unrealized profits outperform another portfolio of those with small magnitude of unrealized profits in the next one month. I construct a variable, *V-shaped selling propensity* (*VSP*) variable, to capture selling pressure from investors' unrealized gains and losses and show that a long-short trading strategy based on this variable, that is buying a portfolio of stocks with high value of *VSP* variable and selling a portfolio of stocks with low value of VSP variable, can generate positive monthly alphas in the next one month.

The remainder of this study is organized as follows. The next section provides a detailed definition of the V-Shaped Disposition effect. Chapter 2 provides a review of existing studies relevant to this study. Chapter 3 describes the data and the key variables and introduces the methodology. Chapter 4 presents the empirical results. Finally, Chapter 5 gives conclusion of this study and recommendation for future studies on this area.

1.2. V-Shaped Selling Schedule and V-Shaped Disposition Effect

The V-Shaped selling schedule, first documented by Ben-David and Hirshleifer (2012), refers to investors' selling propensity that increases as unrealized losses and gains become larger. The empirical evidence in Ben-David and Hirshleifer (2012) also indicates that the slope in the realm of gains is steeper than that in the realm of losses; and that the lowest selling propensity is located around zero profits as illustrated in Figure 1.1.

The asymmetry between the gain side of V and the loss side leads to higher average selling propensity for gains than that for losses so its implication is still in line with many empirical studies on the disposition effect that investors tend to sell winners than losers. Ben-David and Hirshleifer (2012) suggest that the asymmetry V-Shaped selling schedule underlies the disposition effect which An (2016) later calls it as V-Shaped disposition effect.

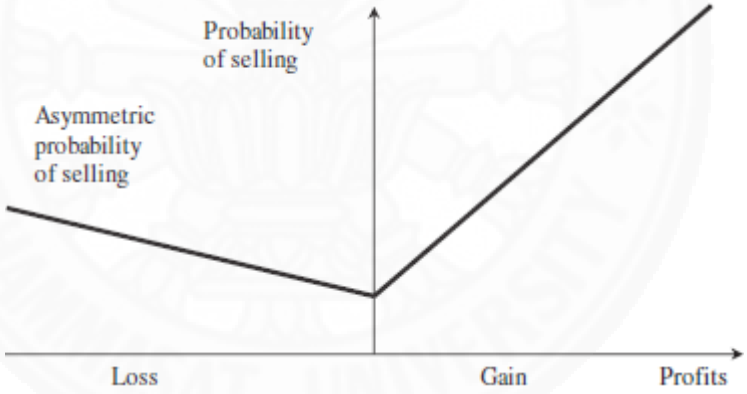

Figure 1.1 V-Shaped Selling Propensity in Response to Profits

Moreover, Ben-David and Hirshleifer (2012) suggest that the disposition effect cannot be necessarily explained as a result of individual preference such as the Prospect theory proposed by Kahneman and Tversky (1979). Under the Prospect theory, investors tend to be risk-seeking in the realm of loss so they would be willing to maintain a risky position after a loss in order to avoid the negative utility from realizing that loss (i.e. loss aversion). However, this is evidently not the case in Ben-David and Hirshleifer (2012) since they find that investors tend to sell more stocks that have gone down in value. They propose that a speculative trading motive (i.e. trading upon beliefs)

of investors is more appropriate in explaining the disposition effect by showing that the strength of the V-shaped selling propensity depends on speculative characteristic of investors.

The mechanism of speculativeness as the source of the V-shaped disposition effect is that speculative investors place purchase transactions on a stock believing that they possess superior information than the market and expect to make positive returns from that information. As little news spread through the market and consequently causes a minor change in price of the stock, these investors have less incentive to update their belief and consequently trade. This can explain why the selling propensity around zero profits is very small. If news, on the other hand, leads to large change in price, they are more inclined to update their belief on the investment position and trade accordingly since it is reasonable to expect the trading activities from belief-updating to be correlated with the magnitude of gain or loss on the investment position of investors. As the price rises, those investors would think that their information has been already incorporated to the price, and on the other hand when the price falls they would reevaluate the genuineness of their information they are trading on. However, the information that induces the investors to trade has no correlation with the intrinsic value of the stock so the downward pressure on the price from their trading activities is just temporary leading to predictable future returns.

CHAPTER 2
REVIEW OF LITERATURE

Behavior finance is the study that combines traditional finance with psychological theories in order to seek for an explanation as to why people do not behave or make decisions reasonably from time to time. The most cited paper under this field is the Prospect theory that is proposed by Kahneman and Tversky (1979). Their study suggests that investors' utility function is different between in the realm of losses and that of gains; that is they are risk averse when they are exposed to gains but they become risk lover when they are in losses.

The Prospect theory has been commonly used to give an explanation to the phenomenon that investors tend to sell winners too early and ride losers too long or the so-called disposition effect proposed by Shefrin and Statman (1985). However, many studies also cast doubt upon whether it is really the preference based Prospect theory that causes this phenomenon. Barberis and Xiong (2009) point out that the Prospect theory can often fail to predict the disposition effect; Hens and Vlcek (2011) also suggests that, under certain settings, the disposition effect cannot be explained by such the Prospect theory. Kaustia (2010) investigates the Prospect theory thoroughly and finds that it can predict holding onto losers but it also predicts holding onto winners.

The disposition effect is widely studied and confirmed to exist across different types of investors, securities, and countries. Odean (1998) suggests that U.S. retail investors behave in accordance to this effect. Garvey and Murphy (2004) and Locke and Mann (2005) show that even professional investors also realize their winning trades faster than the losing ones. Heath, Huddart, and Lang (1999) find this effect in stock options. Shapira and Venezia (2001) analyze the Israeli investment patterns and show that this effect is found in both of professional and individual investors. Chen et al. (2007) finds several behavioral biases including the disposition effect in Chinese stock market. Grinblatt and Keloharju (2001) find this effect among Finnish investors. Last but not least, Calvet, Campbell, and Sodini (2009) find this effect in Swedish retail investors.

Many studies for this literature assume the selling propensity is monotonically increasing in response to profits. Odean (1998) proposes a methodology to measure a spread between the proportion of realized gains and that of realized losses; and suggests that a preference for realizing gains rather than realizing losses among investors exists. Grinblatt and Han (2005), motivated by Prospect theory (Kahneman and Tversky (1979)) and Mental Accounting (Thaler's (1980)), introduces the capital gains overhang variable, which is volume weighting of past returns with reference to the capital gains or losses of investors in each stock, to exhibit that the disposition effect plays an important role in asset pricing and to show that the momentum effect loses its prediction power after adding the new variable. Frazzini (2006) invents another capital gains variable based on net purchase of mutual funds and suggests that the disposition effect induces under reaction to news. Stocks with paper gains lead to a positive post-earning announcement drift while those with paper losses lead to a negative one. Goetzmann and Massa (2008) construct disposition effect proxy variables and indicate that the disposition effect can explain stock returns, volume, and volatility. Moreover, the empirical findings in Grinblatt and Han (2005), Frazzini (2006) and Goetzmann and Massa (2008)'s indicates a link between the disposition effect and equilibrium prices.

A monotonic relationship between sell propensity and profits is challenged by subsequent studies. Ben-David and Hirshleifer (2012) provide empirical evidence showing that the selling propensity is not monotonically increasing in response to profits, instead the relationship between the two is actually a V-shaped function. They also find the alphabet V is not symmetry with a steeper slope on the gain side compared to that on the loss side. With this symmetry in the alphabet V, the average selling propensity on the loss side is less than the average selling propensity on the gain side; that is the tendency to sell winners more than losers still persists in their study.

An (2016) extends Ben-David and Hirshleifer (2012) by constructing stock-level variables to investigate the pricing implications and cross-sectional return predictability of the V-shaped disposition effect. She follows the idea in constructing the capital gain overhang variable from Grinblatt and Han (2005) but separates in two variables to captures the effects of unrealized gains and losses separately. Her study claims that when the selling propensity of investors is aggregated, it can affect asset

pricing and result in lower current prices and leads to return predictability when the prices go back to fundamental values. Under her settings, the variable in Grinblatt and Han (2005) model loses its power in predicting asset returns but the prediction power of her variables still persists. Moreover, she shows that the long-short trading strategy based on this effect provides 0.5-1% monthly alpha return in the following month. On top of that, she forms sorted portfolios based on level of stocks' speculative characteristics and shows that the more speculative stocks are the stronger they exhibit the V-shaped disposition effect. This provides supporting evidence to Ben-David and Hirshleifer (2012) that the effect comes from speculative trading behavior

An and Argyle (2015) continue to further examine the V-shaped disposition effect in another type of investors. They find that even sophisticated investors like mutual fund managers also exhibit this effect and the V-shaped disposition effect is stronger in mutual funds with higher speculative characteristics which include higher trading turnover and shorter average holding period.

The V-shaped selling propensity also appears in several studies but is not their main focus. The empirical results documented by Barber and Odean (2008) exhibit buy-sell imbalances in portfolios sorted on the previous day's return and these imbalances are consistent with the V-shaped selling propensity. Seru, Shumway, and Stoffman (2010) suggest that their plot of relationship between the propensity to sell a stock and the stock's holding period return is actually a V-shaped function with a kink around zero. Since the V-shapes disposition effect is not their main focus, this effect is not formally documented until Ben-David and Hirshleifer (2012). Weisbrod (2015) finds the V-shaped relationship between the likelihood of selling and return since purchase around earning announcement for fund managers in less than or equal 100 day holding period. Additionally, Hartzmark (2015) introduces the Rank effect which describes investors who tend to sell extreme winning and losing securities in their portfolios. This Rank effect is consistent with the V-shaped disposition effect.

As in the U.S. and other countries, the disposition effect has also been investigated on Thai investors and confirmed to exist by several studies. DeWeaver and Shannon (2010) conduct a survey on investors in the stock market and the results of the

survey suggest that the disposition effect derives from cognitive dissonance following losses which subsequently leads to paying less attention to information and slow response to sell losers than winners. Leemakdej (2011) investigates portfolio adjustment of Thai investors and finds that those investors tend to be more cautious and lower their bullish sentiment after two consecutive gains by reducing systematic risk of their portfolio. He indicates that his findings support the disposition effect arising from the loss aversion feature of Prospect theory. Maneenil (2012) adopts the methodology from Bremer and Kato (1996) to examine trading volume for winners and losers and finds out that trading volume for winners is higher than that for losers which exhibits the disposition effect in Thailand's stock market. Similar to Leemakdej (2011), she uses the concept of loss aversion as the underlying cause of the phenomenon. Suppaudom (2014) follows Odean (1998)'s methodology to examine the disposition effect and the results suggest that investors exhibit this behavioral bias. She also finds investors' sophistication, measured by their trading frequency and deviation of their portfolio from the market portfolio, appears to be correlated with the strength of the disposition effect.

CHAPTER 3
RESEARCH METHODOLOGY

3.1. Data and Key Variables

3.1.1. Stock samples and filters

I use daily and monthly stock data of *all* listed companies in the Stock Exchange of Thailand (SET) from January 1996 to December 2015. I exclude stocks with price less than one baht to avoid the impact of small stocks. I also exclude certain stocks that are traded less than 10 days in the previous month to avoid the impact of illiquid stocks. And since I will construct *Capital Overhang Gain* (*Gain*) and *Capital Overhang Loss* (*Loss*) variables using 5-year worth of historical data as we will see later, I require stocks to have at least 5 years of data at the end of each month when the *Gain* and *Loss* variables are to be calculated. I use one month T-bill rate obtained from the official website of Bank of Thailand (https://www.bot.or.th) as a representative of the risk-free rate which is being used to construct idiosyncratic volatility ($IVOL$) variable. My sample results in 42,000 stock-month combinations which is on average approximately 250 stocks for each month in the sample period.

3.1.2. Gain, Loss, and the V-shaped Selling Propensity Variables

I adopt the construction of these variables from An (2016). The aggregate unrealized gains and losses are measured separately by using volume-weighted of the percentage deviation of purchase price from current price. *Capital Overhang Gain* (*Gain*) is constructed to capture the effect of unrealized gains. *Capital Overhang Loss* (*Loss*) is constructed to capture the effect of unrealized losses. For each stock, these two variables are calculated using daily closing data for the past 5 years or 1,250 trading days. The *Gain* variable is computed as follows;

$$Gain_t = \sum_{n=1}^{1250} \omega_{t-n} gain_{t-n} \qquad (1)$$

$$gain_{t-n} = \begin{cases} 0, & P_t < P_{t-n} \\ \dfrac{P_t - P_{t-n}}{P_t}, & P_t \geq P_{t-n} \end{cases} \quad (2)$$

$$\omega_{t-n} = \frac{1}{k}\theta_{t-n}\prod_{i=1}^{n-1}[1-\theta_{t-n+i}] \quad (3)$$

θ_{t-n} is the daily turnover ratio, which is calculated by dividing total number of shares traded by number of shares outstanding, at time *t* - *n*. The weight (ω_{t-n}) is the fraction of stocks that are bought at time *t* – *n* and have not been sold since then. The constant *k* is used to normalize all the ω_{t-n} so that the summation of ω_t for the five-year period is equal to one as follows;

$$k = \sum_{n}\theta_{t-n}\prod_{i=1}^{n-1}[1-\theta_{t-n+i}] \quad (4)$$

The assumption behind is that the probability for a stock to be traded depends solely on the turnover ratio. Hence, the probability for a stock to be purchased at $t-n$ is the turnover ratio at that time. On the other hand, the probability for that stock not to be traded since purchase is equal to the multiplication of one minus such the turnover ratio along the holding period, which is in this case from $t-n+1$ to $t-1$. Since the *Gain* variable captures the gain effect only, $gain_{t-n}$ will be equal to zero when the current price is less than the purchase price. The 5-year window is chosen because it allows different trading horizons among different groups of investors. Even though Ben-David and Hirshleifer (2012) find that the V-shaped selling propensity becomes flatter for more than one year investment horizon among retail investors, the disposition effect is not limited to that type of investors.

Similar to the *Gain* variable, the *Loss* variable is computed as follows.

$$Loss_t = \sum_{n=1}^{1250} \omega_{t-n} loss_{t-n} \tag{5}$$

$$loss_{t-n} = \begin{cases} \dfrac{P_t - P_{t-n}}{P_t}, & P_t < P_{t-n} \\ 0, & P_t \geq P_{t-n} \end{cases} \tag{6}$$

$$\omega_{t-n} = \frac{1}{k} \theta_{t-n} \prod_{i=1}^{n-1} [1 - \theta_{t-n+i}] \tag{7}$$

By this construction, if the current price is higher than all of the 5 year historical prices, the *Loss* variable will be zero and vice versa for the *Gain* variable.

To reflect the asymmetry in the V-shaped selling propensity, the V-shaped Selling Propensity (*VSP*) is constructed as follows;

$$VSP_t = Gain_t - \rho Loss_t \tag{8}$$

The coefficient ρ indicates the strength of selling pressure on the loss side compared to that on the gain side. In other words, it indicates how much steeper the slope on the loss side is compared to that on the gain side. Since the slope on the gain side is steeper than that on the loss side, the coefficient ρ shall be smaller than one and calculated in subsection 3.2.1.

3.1.3. Other Control Variables

Firstly, I define a monthly return for each stock in the sample as Ret. The monthly return is simply calculated as the change of stock price in a month divided by price at the end of previous month. And to separate the effects of the *Loss* and *Gain* variables, variables that are empirically claimed to affect future returns are controlled in the models of this study. Since these *Gain* and *Loss* variables are constructed using prices for the past five years, they tend to correlate with past returns. As a consequence, variables that represent past returns have to be constructed and controlled in order to tease out the effects of the two variables on future returns. The past twelve- to two-

month cumulative return ($Ret_{-12:-2}$) is meant to control the medium-term horizon momentum effect documented in Jegadeesh and Titman (1993). The variable is separated into positive and negative part (${}^{+}Ret_{-12:-2}$ and ${}^{-}Ret_{-12:-2}$) to address the concern documented in Hong, Lim, and Stein (2000) that the momentum effect is greater for past losers than past winners. Hence, part of momentum effect on losers will not be captured by the model that imposes the same coefficient for winners and losers. The short-term and long-term momentum effects are controlled by the past month return (Ret_{-1}) and the past three- to one-year cumulative return ($Ret_{-36:-13}$), respectively.

The average daily turnover ratio in the past year ($TOver$) is included in the models to address the concerns documented in Lee and Swaminathan (2000) and Gervais, Kaniel, and Mingelgrin (2001) that turnover ratio and trading volume can affect future returns. To address the concern that high idiosyncratic volatility relative to Fama and French (1993) would lead to low future returns documented in Ang et al. (2006), the idiosyncratic volatility ($IVOL$) calculated from the daily volatility of return residuals relative to Fama and French (1993) in the past year is also included. The logarithm of a firm's market capitalization ($LogMCap$) is controlled for the return premium effect of firm size. Last, the models also account for the book-to-market effect so the logarithm of book-to-market ratio ($LogBTM$) is included.

3.2. Methodology

I apply Fama-Macbeth (1973) regressions to examine how *Loss* and *Gain* variables affect future returns. I then examine a monthly alpha generated by the long-short strategy based on the *VSP* variable.

3.2.1. The Effects of Gains and Losses on Asset Prices

I begin by testing the hypothesis that, on an aggregate level, unrealized gains and losses generate return patterns that are consistent with the V-shaped selling schedule.

Hypothesis I: Stocks face higher selling pressure from V-shaped-disposition-prone investors when unrealized gains or losses become larger. The higher selling pressure in aggregate causes stock prices to be temporarily lower and lead to higher subsequent return when stock prices go back to their fundamental value.

To better control the factors known to affect future returns which previously mentioned in subsection 3.1.3, Fama-Macbeth (1973) regressions with weights equal to the previous month gross return are employed to examine the implications of gains and losses on asset pricing. The effects of *Gain* and *Loss* variables are estimated separately by the regression model that takes the following form.

$$Ret_t^i = \alpha_1 + \beta_1 Gain_{t-1}^i + \beta_2 Loss_{t-1}^i + \beta_3 Ret_{t-1}^i + \beta_4 {}^{+}Ret_{t-12:t-2}^i + \beta_5 {}^{-}Ret_{t-12:t-2}^i + \beta_6 Ret_{t-36:t-13}^i + \beta_7 LogBTM_{t-1}^i + \beta_8 LogMCap_{t-1}^i + \beta_9 TOver_{t-1}^i + \beta_{10} IVOL_{t-1}^i + \varepsilon_t^i \quad (9)$$

To confirm the hypothesis, the estimated coefficients for both variables must be statistically significant. On top of that, the estimated coefficient of the *Gain* variable ($\widehat{\beta_1}$) should take positive value and that of the *Loss* variable ($\widehat{\beta_2}$) should take negative value because an increase in the value of the *Loss* variable indicates a decrease in magnitude of losses and hence lower future returns.

The absolute value of the estimated coefficient of the *Gain* variable should be higher than the absolute value of the estimated coefficient of the *loss* variable ($\widehat{\beta_1} > |\widehat{\beta_2}|$) to reflect the asymmetry of the V-shaped selling propensity; that is the effect of gains should be relatively higher than the effect of losses.

Another main purpose of this subsection beside to confirm the hypothesis is to obtain the coefficient ρ, previously mentioned in subsection 3.1.2, which indicates how much steeper the slope on the loss side is compared to that on the gain side. The coefficient ρ is computed by the absolute value of the estimated coefficient of the *loss* variable divided by that of the *Gain* variable (i.e. $|\widehat{\beta_2}|/\widehat{\beta_1}$). And once the coefficient ρ is obtained, the *VSP* variable can be computed for each stock in the sample and then plugged in to the model in subsection 3.2.2.

3.2.2. The Effect of the V-shaped Selling Propensity on Asset Prices

In previous section, both unrealized gains and losses can significantly generate return predictivity but how much benefit one can make from knowing this could also be interesting to find out. Hence, I setup the hypothesis as follows.

Hypothesis II: A long-short trading strategy based on the V-Shaped disposition effect generates a positive monthly alpha return in the next one month.

Again, I employ the same procedure as that in subsection 3.2.1 to investigate the implications of the V-shaped selling propensity on asset pricing. The regression model is exactly the same as the one used to investigate the effects of gains and losses on asset pricing except the *Gain* and *Loss* variables being replaced with the *VSP* variable as shown below.

$$\begin{aligned} Ret_t^i = {} & \alpha_2 + \beta_{11} VSP_{t-1}^i + \beta_{12} Ret_{t-1}^i + \beta_{13}\, {}^{+}Ret_{t-12:t-2}^i \\ & + \beta_{14}\, {}^{-}Ret_{t-12:t-2}^i + \beta_{15} Ret_{t-36:t-13}^i + \beta_{16} LogBTM_{t-1}^i \\ & + \beta_{17} LogMCap_{t-1}^i + \beta_{18} TOver_{t-1}^i + \beta_{19} IVOL_{t-1}^i + \varepsilon_t^i \end{aligned} \tag{10}$$

The $VSP_{i,t-1}$ is computed using this equation: $VSP_{i,t-1} = Gain_{i,t-1} - \rho Loss_{i,t-1}$ where the coefficient ρ is obtained by the methodology described in subsection 3.2.1. By this construction, the *VSP* variable recognizes the asymmetry of the V-shaped selling propensity.

The difference in average values of the *VSP* variable between the 10th and the 90th percentiles is calculated for each month in the sample period. The differences for the whole sample period then are averaged out and the result will be multiplied with the estimated coefficient for the *VSP* variable ($\widehat{\beta_{11}}$) to obtain average monthly alpha of the trading strategy based on this effect; that is investors would long stocks with high value of *VSP* and short those with low value of *VSP*. To confirm the hypothesis, the monthly alpha obtained should be positive.

CHAPTER 4
RESULTS AND DISCUSSION

4.1. Data summary statistics

Descriptive statistics of *Gain, Loss, VSP* variables and the control variables are shown in Table 4.1. All of the independent variables are winsorized at 1% in both tails. Table 4.2 presents correlations among these independent variables. Both of the summary statistics and the correlations are calculated at monthly level.

Table 4.1 Summary statistics of *Gain, Loss, VSP,* and control variables

	$Gain$	$Loss$	VSP				
$mean$	0.1338	-0.1785	0.1887				
$p50$	0.0829	-0.0662	0.1527				
sd	0.1394	0.2855	0.1251				
$skewness$	1.0839	-3.3876	1.1687				
$p10$	0.0024	-0.4973	0.0611				
$p90$	0.3590	-0.0009	0.3802				
	Ret_{-1}	$Ret_{-12:-2}$	$Ret_{-36:-13}$	$LogBTM$	$LogMCap$	$TOver$	$IVOL$
$mean$	0.0113	0.1985	0.4684	-0.2247	22.0762	0.0248	0.0228
$p50$	0.0035	0.0806	0.2121	-0.1838	21.8964	0.0017	0.0206
sd	0.1011	0.5124	0.9818	0.7099	1.5768	0.0948	0.0095
$skewness$	0.5185	2.0401	2.8687	-0.2841	0.3556	4.3551	0.9597
$p10$	-0.1000	-0.2833	-0.3889	-1.1908	20.1071	0.0001	0.0124
$p90$	0.1333	0.8025	1.6214	0.6276	24.4223	0.0137	0.0373

It is not surprise to see *VSP* and *Gain* variables are highly correlated at the coefficient of 0.78. This is because *VSP* variable is constructed from *Gain* and *Loss* variables and about 80% of the value of *VSP* variable comes from *Gain* variable as I will discuss about the calculation in detail in the next subsection. On top of that, the high correlation coefficients between *Gain* and *Loss* variables and part return at medium-term horizon, $Ret_{-12:-2}$, confirms the importance of controlling the part returns at different horizons to ensure that the effects of *Gain* and *Loss* variables captured will not contaminate with the effects of the parts returns.

Table 4.2 Correlation table

	$Gain$	$Loss$	VSP	Ret_{-1}	$Ret_{-12:-2}$	$Ret^{+}_{-12:-2}$	$Ret^{-}_{-12:-2}$	$Ret_{-36:-13}$	$LogBTM$	$LogMCap$	$TOver$	$IVOL$
$Gain$	1											
$Loss$	0.4693	1										
VSP	0.7853	-0.1781	1									
Ret_{-1}	0.2612	0.2428	0.1208	1								
$Ret_{-12:-2}$	0.387	0.3626	0.1771	0.0123	1							
$Ret^{+}_{-12:-2}$	0.3331	0.2272	0.2119	0.012	0.9681	1						
$Ret^{-}_{-12:-2}$	0.3584	0.613	-0.0304	0.0066	0.5752	0.352	1					
$Ret_{-36:-13}$	0.1874	0.1143	0.1286	-0.0116	-0.1093	-0.0834	-0.1361	1				
$LogBTM$	-0.0967	-0.0595	-0.066	0.0678	0.1885	0.1721	0.1424	-0.3594	1			
$LogMCap$	0.2217	0.2208	0.0922	0.0325	0.074	0.0555	0.0953	0.1292	-0.4782	1		
$TOver$	-0.166	0.0164	-0.1965	0	0.171	0.1972	-0.0053	0.0322	0.0473	-0.1225	1	
$IVOL$	-0.0903	-0.1875	0.0309	0.036	0.2973	0.3604	-0.0658	-0.0305	0.2166	-0.3678	0.33	1

4.2. The Effects of Gains and Losses on Asset Prices

After performing the Fama-Macbeth procedure with weights equal to the prior-month gross return, I obtain regression results from estimating equation (9) as reported in Table 4.3**.**

Table 4.3 Fama-Macbeth regression on *Gain*, *Loss* and the control variables

	$Gain$	$Loss$	Ret_{-1}	$Ret^{+}_{-12:-2}$	$Ret^{-}_{-12:-2}$	$Ret_{-36:-1}$	$LogBTM$	$LogMCap$	$TOver$	$IVOL$	$\_cons$
β	0.041*	-0.013	0.053**	0.070	0.077*	-0.006	-0.006	-0.005**	0.005	-0.212	0.112***
$t - stat$	2.29	-0.82	2.66	1.31	2.57	-1.73	-1.45	-3.12	0.23	-0.78	3.36

The estimated coefficient for $Gain$ variable is positive and the one for $Loss$ variable is negative as the V-Shaped disposition effect framework suggests. The effect of $Gain$ variable is significant at the confidence level of 95%; however, the effect of $Loss$ variable is not statistically significant at all indicating a weak evidence on the loss side of the V-shaped selling propensity. This partially confirms *Hypothesis I* that stocks with large magnitude of unrealized gain predicts higher positive subsequent return and those with large magnitude of unrealized loss seems to predict higher positive subsequent return.

Nonetheless, the regression results still indicate that the effect of $Gain$ variable is stronger than that of $Loss$ variable. The gain side effect is about $\frac{0.041}{0.013}$ = 3.15 times as strong as the loss side effect, meaning the slope of the gain side of the V-shaped relationship is approximately 3.15 times steeper than that of the loss side which confirms an asymmetry shape of the V. Based on equation (8), ρ can be obtained by dividing the coefficient for $Loss$ variable by that of $Gain$ variable; therefore, ρ in this case is equal to $\left|-\frac{0.013}{0.041}\right|$ = 0.31. The coefficient of 0.31 is close to what An (2016) documents in her study where she obtains the coefficient of 0.23 from regressing on her sample. However, it is important to note that even though the coefficient to be obtained for VSP variable is significant, it could not be fully confirmed *Hypothesis II* because the coefficient for $Loss$ variable, which is used to calculate ρ, is not statistically significant.

The effect of the past month return, Ret_{-1}, is statistically significant at confidence level of 99% in the regression result. This suggests that the short-term momentum effect is evidently present in the market.

Estimated coefficients of the other control variables seem to be consistent with other studies on asset pricings. The coefficients of the past twelve-to-two-month return variables indicate that the positive part has a weaker effect than the negative part but only the negative part is statistically significant. The size of the coefficients is consistent with Hong, Lim, and Stein (2000) who find that the big bulk of the momentum effect comes from the losers rather than winners. On top of that, there appears to be a significant negative relationship between the idiosyncratic volatility and subsequent return. This essentially means that stock with low idiosyncratic would outperform those with high idiosyncratic ceteris paribus. This is well in line with Ang et al. (2006). Unsurprisingly, the return premium effect of firm size, the outperformance of small market capitalization stocks, is captured by the model with confidence level of 99%. However, the return premium effect of firm value does not seem to significantly contribute much in predicting the subsequent return.

In the main specification, $Gain$ and $Loss$ variables are constructed using the 5-year window of historical data following the window in An (2016). Here, I vary the window of historical data for $Gain$ and $Loss$ variables to capture the effect of unrealized gains and losses among investors with different average holding periods, in particular 6- to 2- year holding periods. The control variables remain the same as equation (9). The regression results from perform Fama-Macbeth procedure are reported in Table 4.4 Table 4.3**.**

Table 4.4 Alternative specifications Fama-Macbeth regressions

	$6-year$ $horizon$	$5-year$ $horizon$	$4-year$ $horizon$	$3-year$ $horizon$	$2-year$ $horizon$
$Gain$	0.031	0.041*	0.052**	0.070***	0.096***
	(1.87)	(2.29)	(2.72)	(3.36)	(3.50)
$Loss$	-0.002	-0.013	-0.011	-0.018	-0.018
	(-0.14)	(-0.82)	(-0.82)	(-1.35)	(-1.38)
Ret_{-1}	0.035*	0.053**	0.043*	0.036	0.030
	(2.02)	(2.66)	(2.13)	(1.76)	(1.41)
$Ret^{+}_{-12:-2}$	0.063	0.070	-0.012	-0.012	-0.002
	(1.03)	(1.31)	(-0.27)	(-0.32)	(-0.07)
$Ret^{-}_{-12:-2}$	0.065*	0.077*	0.051*	0.045*	0.047*
	(2.32)	(2.57)	(2.24)	(2.11)	(2.19)
$Ret_{-36:-13}$	-0.006	-0.006	-0.006	-0.005	-0.005
	(-1.62)	(-1.73)	(-1.74)	(-1.61)	(-1.53)
$LogBTM$	-0.006	-0.006	-0.004	-0.003	-0.004
	(-1.56)	(-1.45)	(-1.20)	(-0.96)	(-1.08)
$LogMCap$	-0.005**	-0.005**	-0.005**	-0.004**	-0.004**
	(-3.06)	(-3.12)	(-3.03)	(-2.73)	(-3.05)
$TOver$	-0.005	0.005	0.014	0.019	0.033
	(-0.24)	(0.23)	(0.60)	(0.73)	(1.07)
$IVOL$	-0.235	-0.212	-0.106	-0.124	-0.126
	(-0.94)	(-0.78)	(-0.38)	(-0.44)	(-0.45)
$\_cons$	0.108**	0.112***	0.108**	0.092**	0.097**
	(3.28)	(3.36)	(3.22)	(2.89)	(3.22)

Table 4.4 presents the results from Fama-Macbeth regressions on $Gain$ and $Loss$ variables using different windows of historical data. The sign of coefficients for $Gain$ and $Loss$ variables is still consistent with the V-shaped disposition effect framework for all holding periods indicating that the results are robust. On top of that, the magnitude of coefficient for $Gain$ variable and that for $Loss$ variable in absolute term seem to be negatively correlated with holding periods of investors. This suggests that the strength of V-shaped selling schedule is stronger among investors with shorter holding period; that is the slopes on both sides of the V are steeper as holding period becomes sooner. The results seem to be in line Ben-David and Hirshleifer (2012) who find that the effect of the V-shaped selling schedule is strongest for short-term prior holding periods.

4.3. The Effect of the V-shaped Selling Propensity on Asset Prices

Using the ρ obtained in subsection 4.2, I calculate VSP variable for each stock at the end of months in the sample and then perform Fama-Macbeth procedure with weights equal to the prior-month gross return to obtain the coefficient of VSP variable denoted in equation (10). The regression results are displayed in Table 4.5**.**

Table 4.5 Fama-Macbeth regression on *VSP* and the control variables

	VSP	Ret_{-1}	$Ret^{+}_{-12:-2}$	$Ret^{-}_{-12:-2}$	$Ret_{-36:-13}$	$LogBTM$	$LogMCap$	$TOver$	$IVOL$	$\_cons$
β	0.043**	0.047*	0.066	0.068**	-0.007*	-0.006	-0.005**	0.004	-0.213	0.121**
$t-stat$	2.75	2.45	1.28	2.65	-2.08	-1.48	-3.01	0.22	-0.76	3.28

According to the results, the t-statistic for VSP variable is statistically significant at confidence level of 99% indicating a stronger predictive power than that of $Gain$ variable. The coefficient is positive indicating that the V-Shaped selling propensity is positively associated with future returns, in this case the future one-month returns. Nonetheless, as mentioned in subsection 4.2, the coefficient for $Loss$ variable is not statistically significant so the results obtained from using insignificant coefficient may be classified as weak evidence even if I obtain a very strong significance for the coefficient for VSP variable.

Taken all together, the results partially confirm *Hypothesis II* that a long-short trading strategy based on the V-Shaped disposition effect generates a positive monthly alpha return in the next one month.

To numerically calculate a monthly alpha the trading strategy historically generated, for each month in the sample period I calculate the difference between 10^{th} and 90^{th} percentile portfolios and then find the time-series average of those differences. The average monthly difference obtained is 0.387; hence, a monthly alpha generated is equal to 0.0166 which equals to return of 0.20 per annum.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

This study provides an evidence of the newly documented refinement of the disposition effect called V-Shaped disposition effect that describes a tendency of investors to sell more when unrealize gains and losses of their portfolios are larger. This behavior is studied using data from Thailand's stock market at stock level with the assumption that investor selling tendencies can aggregate to affect stocks by temporarily putting down stock prices and lead to consequent return predictivity when the prices go back to fundamental values. By constructing variables that measure unrealized gains and losses of stocks, I show an evidence in support of the assumption that stocks with larger unrealized gains and losses can lead to higher subsequent. The result from Fama-Macbeth (1973) regression suggests that the evidence on the gain side of the V is strong and significant indicating that selling propensity of investors in the market increases as the magnitude of unrealized gains increases. However, the evidence on the loss side of the V is statistically weak but still consistent with previous studies that is investors tend to sell more when they have larger unrealized losses. The result also shows that the effect on the gain side is stronger than the loss side so the asymmetry of the V shape documented in previous studies also appears in this study. This asymmetry, as suggested by previous studies, underlies the traditional disposition effect that is investors tend to sell more gains than losses. Furthermore, by constructing another variable that recognizes the asymmetry of the V in investors' selling propensity, I find that a long-short trading strategy based on this effect could generate 1.66% monthly alpha or 20% per annum on average for the study period.

My further analysis on the strength of the effects of unrealized gains and losses suggests that the effects of both sides depend on investors' holding period. I find that investors with shorter holding period tend to sell more compared to those with longer holding period when they have the same level of unrealized gains and losses. This finding is in line with previous studies that find a strength of the V-Shaped disposition effect is associated with investors' holding period that is the effect is stronger among investors with short holding period.

The recommendation for future studies on this area is to analyze this behavior at an individual level. An individual-level evidence of this behavior is necessary in order to further confirm the existence of this behavior in the market in addition to the stock-level evidence documented in this study. Future studies on this area can also further investigate into the source of this effect in the market whether it is investors' speculativeness that underlies this effect as suggested by previous studies. Using investor level data would help to better define speculative characteristics of investors and provide a confirmation of the conjecture.

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